

**IN THE CLAIMS:**

1     1.     (Currently amended) A router controlling congestion on links attached to the  
2 router, said router comprising:  
3         a plurality of ports;  
4         a first port of said plurality of ports for receiving a data packet;  
5         a second port of said plurality of ports for transmitting said data packet;  
6         a receiver to receive an incoming loss report message on said second port;  
7         a first processor to determine loss of packets on selected ports of said plurality of  
8 ports;  
9         a second processor to calculate, in response to said incoming loss report message  
10 | and said loss of packets, a loss rate statistic; and  
11         a transmitter to transmit an outgoing loss report message through said first port,  
12 said outgoing loss report message containing a field having said loss rate statistic written  
13 therein.

1     2.     (Cancelled)

1     3.     (Cancelled)

1     4.     (Previously presented) The router as in claim 1 wherein said loss rate statistic is a  
2 largest loss rate in a set of loss rates determined for said selected ports of said plurality of  
3 ports.

1     5.     (Currently amended) A router controlling congestion on links attached to the  
2 router, said router comprising:

3           a plurality of ports;  
4           a first port of said plurality of ports for receiving a data packet;  
5           a second port of said plurality of ports for transmitting said data packet;  
6           a receiver to receive an incoming loss report message on said second port;  
7           a first processor to determine loss of packets on selected ports of said plurality of  
8 ports;  
9           a second processor to calculate, in response to said incoming loss report message  
10 | and said loss of packets, a loss rate statistic; and  
11           a transmitter to transmit an outgoing loss report message through said first port,  
12 said outgoing loss report message containing a field having said loss rate statistic written  
13 therein,  
14           wherein said loss rate statistic is a time averaged loss rate.

1   6.       (Previously presented) The router of claim 1, further comprising:  
2           a linecard supporting at least one of said plurality of ports, said linecard having  
3 said first processor and a memory mounted thereon, said first processor computing said  
4 loss of packets.

1   7.       (Previously presented) The router of claim 1, further comprising: said outgoing  
2 loss report message is carried in a NAK packet.

1   8.       (Previously presented) The router of claim 1, further comprising: said outgoing  
2 loss report message is transmitted by said router in response to the router receiving a loss  
3 report message from a downstream router.

- 1 9. (Previously presented) The router of claim 1, further comprising: said outgoing  
2 loss report message is transmitted by said router in response to the router receiving a loss  
3 report message from a downstream receiver station.
- 1 10. (Previously presented) The router of claim 1, further comprising: said outgoing  
2 loss report message is periodically transmitted by said router.
- 1 11. (Previously presented) The router of claim 1, further comprising:  
2 a central processor (CPU) forwarding engine, said CPU forwarding engine determining  
3 which port said outgoing loss report message is to be transmitted.
- 1 12. (Previously presented) The router as in claim 1, further comprising:  
2 a central processor (CPU) control engine, said CPU control engine generating said outgo-  
3 ing loss report message.
- 1 13. (Currently amended) A method for operating a router, said method comprising:  
2 receiving a multicast group data packet at a first port;  
3 transmitting a replica of said multicast group data packet from a second port;  
4 receiving an incoming loss report message on said second port;  
5 computing a loss of packets on selected ports of said router;  
6 calculating, in response to said incoming loss report message and said loss of  
7 packets, a loss rate statistic; and  
8 transmitting an outgoing loss report message through said first port, said outgoing  
9 loss report message containing said loss rate statistic in a field of said outgoing loss re-  
10 port message.

1 14. (Previously presented) The method of claim 13, further comprising:  
2 choosing said loss rate statistic as a largest packet loss rate in a set of loss rates computed  
3 for said selected ports of said router.

1 15. (Previously presented) A method for operating a router, said method compris-  
2 ing:  
3 receiving a multicast group data packet at a first port;  
4 transmitting a replica of said multicast group data packet from a second port;  
5 receiving an incoming loss report message on said second port;  
6 computing a loss of packets on selected ports of said router;  
7 calculating, in response to said incoming loss report message and said loss of  
8 packets, a loss rate statistic;  
9 transmitting an outgoing loss report message through said first port, said outgoing  
10 loss report message containing said loss rate statistic in a field of said outgoing loss re-  
11 port message; and  
12 choosing said loss rate statistic as a time averaged packet loss rate as determined  
13 by said router.

1 16. (Original) The method of claim 13, further comprising:  
2 selecting said selected ports as members of a multicast group distribution tree.

1 17. (Currently amended) The method of claim 13, further comprising:  
2 determining a loss rate statistic which has not expired for at least one port of said  
3 router, where said at least one port includes all ports of a multicast group distribution tree  
4 of said multicast group; and  
5 writing said loss rate statistic into said outgoing loss report message before trans-  
6 mitting said outgoing loss report message.

- 1 18. (Previously presented) The method of claim 13, further comprising: transmitting  
2 said outgoing loss report message as a NAK packet.
- 1 19. (Previously presented) The method of claim 13, further comprising: transmitting  
2 said outgoing loss report message in response to receiving said incoming loss report mes-  
3 sage.
- 1 20. (Previously presented) The method of claim 13, further comprising: transmitting  
2 said outgoing loss report message periodically.
- 1 21. (Previously presented) The method of claim 13, further comprising: transmitting  
2 said outgoing loss report message as a unicast message to a next upstream router capable  
3 of responding to said outgoing loss report message.
- 1 22. (Original) The method of claim 13 further comprising: transmitting said outgo-  
2 ing loss report message as a multicast message.
- 1 23. (Currently amended) A router, comprising:  
2 means for receiving a multicast group data packet at a first port;  
3 means for transmitting a replica of said multicast group data packet from a second  
4 port;  
5 means for receiving an incoming loss report message on said second port;  
6 means for computing a loss of packets on selected ports of said router;  
7 means for calculating, in response to said incoming loss report message and said  
8 | loss of packets, a loss rate statistic; and

9 means for transmitting an outgoing loss report message through said first port,  
10 said outgoing loss report message containing said loss rate statistic in a field of said out-  
11 going loss report message.

1 24. (Original) A computer readable media having instructions written thereon for  
2 practicing the method of claim 13.

1 25. (Previously presented) Electromagnetic signals carried on a computer network,  
2 said electromagnetic signals carrying instructions for practicing the method of claim 13.

1 26. (Previously presented) The router as in claim 1, wherein said outgoing loss report  
2 message is received at a source station of a multicast distribution tree, said source station  
3 controlling a transmission rate of data packets transmitted in said multicast distribution  
4 tree based on the value of said loss rate statistic stored in said outgoing loss report mes-  
5 sage.

1 27. (Previously presented) The method as in claim 13, further comprising:  
2 receiving said outgoing loss report message at a source station of a multicast dis-  
3 tribution tree; and  
4 controlling, in response to receiving said outgoing loss report message, a trans-  
5 mission rate of data packets transmitted by said source station in said multicast distribu-  
6 tion tree based on the value of said loss rate statistic stored in said outgoing loss report  
7 message.

1 28. (Previously presented) The router as in claim 1, wherein said outgoing loss report  
2 message is not transmitted by said transmitter if an absolute value of a fractional change

3 of said loss rate statistic, as compared with a previous loss rate statistic, is less than or  
4 equal to a predetermined limit value.

1 29. (Previously presented) The method as in claim 13, further comprising:  
2 calculating an absolute value of a fractional change of said loss rate statistic as  
3 compared with a previous loss rate statistic; and  
4 preventing, in response to said calculated absolute value being less than or equal  
5 to a predetermined limit value, transmission of said outgoing loss report message.

1 30. (Previously presented) The router as in claim 1, wherein said outgoing loss report  
2 message stores a lifetime associated with said loss rate statistic, said lifetime indicating a  
3 duration of time for which said loss rate statistic is valid.

1 31. (Previously presented) The method of claim 13, further comprising:  
2 associating with said loss rate statistic a lifetime for aging said loss rate statistic;  
3 determining whether said loss rate statistic is valid based on the value of said life-  
4 time associated with said loss rate statistic; and  
5 writing, in response to determining that said loss rate statistic is valid, said loss  
6 rate statistic into said outgoing loss report message before transmitting said outgoing loss  
7 report message.

1 32. (Previously presented) A router controlling congestion on links attached to the  
2 router, said router comprising:  
3 a plurality of ports;  
4 a first port of said plurality of ports for receiving a data packet;  
5 a second port of said plurality of ports for transmitting said data packet;

6 a receiver configured to receive an incoming loss report message on said second  
7 port;

8 a processor configured to determine loss of packets on selected ports of said plu-  
9 rality of ports, said processor being further configured to calculate, in response to said  
10 incoming loss report message and said loss of packets, a loss rate statistic; and

11 a transmitter configured to transmit an outgoing loss report message through said  
12 first port, said outgoing loss report message containing a field having said loss rate statis-  
13 tic written therein.

1 33. (Previously presented) A router controlling congestion on links attached to the  
2 router, said router comprising:

3 a plurality of ports;

4 a first port of said plurality of ports for receiving a data packet;

5 a second port of said plurality of ports for transmitting said data packet in a down-  
6 stream direction;

7 a processor configured to determine loss of packets on a port of said plurality of  
8 ports and, in response to said loss of packets, to calculate a loss rate statistic; and

9 a transmitter configured to transmit an outgoing loss report message through said  
10 first port in an upstream direction, said outgoing loss report message containing a field  
11 having said loss rate statistic written therein.

1 34. (Currently amended) The router as in claim 33, further comprising:

2 a receiver to receive a loss report message on said second port, said loss report  
3 ~~travelling-traveling~~ in said upstream direction; and

4 said processor to calculate said loss rate statistic in response to said loss of pack-  
5 ets and in response to said loss report.



- 1 35. (Previously presented) The router as in claim 33, further comprising:  
2 said loss rate statistic is a largest loss rate in a set of loss rates determined for said  
3 selected ports of said plurality of ports.
- 1 36. (Previously presented) The router as in claim 33, further comprising:  
2 said loss rate statistic is a time averaged loss rate.
- 1 37. (Previously presented) The router of claim 33, further comprising:  
2 a linecard supporting at least one of said plurality of ports, said linecard having a  
3 linecard processor and a memory mounted thereon, said linecard processor computing  
4 said loss of packets.
- 1 38. (Previously presented) The router of claim 33, further comprising:  
2 a central processor (CPU) forwarding engine, said CPU forwarding engine deter-  
3 mining which port said outgoing loss report message is to be transmitted.
- 1 39. (Previously presented) The router as in claim 33, further comprising:  
2 a central processor (CPU) control engine, said CPU control engine generating said  
3 outgoing loss report message.
- 1 40. (Previously presented) The router of claim 33, further comprising:  
2 said outgoing loss report message is carried in a NAK packet.

41. (Previously presented) The router of claim 33, further comprising:  
1 said outgoing loss report message is transmitted by said router in response to the  
2 router receiving a loss report message from a downstream router.
42. (Previously presented) The router of claim 33, further comprising:  
2 said outgoing loss report message is periodically transmitted by said router.
43. (Previously presented) The router as in claim 33, further comprising:  
2 said outgoing loss report message is received at a source station of a multicast  
3 distribution tree, said source station controlling a transmission rate of data packets trans-  
4 mitted in said multicast distribution tree based on the value of said loss rate statistic  
5 stored in said outgoing loss report message.
44. (Previously presented) The router as in claim 33, further comprising:  
2 means for receiving said outgoing loss report message at a source station of a  
3 multicast distribution tree; and  
4 means for controlling, in response to receiving said outgoing loss report message,  
5 a transmission rate of data packets transmitted by said source station in said multicast dis-  
6 tribution tree based on the value of said loss rate statistic stored in said outgoing loss re-  
7 port message.
45. (Previously presented) The router as in claim 33, further comprising:  
2 said outgoing loss report message is not transmitted by said transmitter if an abso-  
3 lute value of a fractional change of said loss rate statistic, as compared with a previous  
4 loss rate statistic, is less than or equal to a predetermined limit value.

- 1 46. (Previously presented) The router as in claim 33, further comprising:  
2 said outgoing loss report message stores a lifetime associated with said loss rate  
3 statistic, said lifetime indicating a duration of time for which said loss rate statistic is  
4 valid.
- 1 47. (Currently amended) A method for operating a router, comprising:  
2 receiving a data packet ~~travelling~~ traveling in a downstream direction at a first  
3 port;  
4 transmitting a replica of said data packet from a second port in said downstream  
5 direction;  
6 computing a loss of packets on selected ports of said router;  
7 calculating, in response to said loss of packets, a loss rate statistic; and  
8 transmitting an outgoing loss report message through said first port in an upstream  
9 direction, said outgoing loss report message containing said loss rate statistic in a field of  
10 said outgoing loss report message.
- 1 48. (Currently amended) The router as in claim 47, further comprising:  
2 receiving a loss report message on said second port, said loss report ~~travelling~~  
3 traveling in said upstream direction; and  
4 calculating said loss rate statistic in response to said loss of packets and in re-  
5 sponse to said loss report.
- 1 49. (Previously presented) The method of claim 47, further comprising:  
2 calculating said loss rate statistic as a largest loss rate in a set of loss rates deter-  
3 mined for said selected ports of said plurality of ports.

- 1 50. (Previously presented) The method of claim 47, further comprising:  
2 calculating said loss rate statistic as a time averaged loss rate.
- 1 51. (Previously presented) The method of claim 47, further comprising:  
2 computing said loss of packets by a processor mounted on a linecard, said line-  
3 card supporting at least one of said plurality of ports, said linecard having said linecard  
4 processor and a memory mounted thereon.
- 1 52. (Previously presented) The method of claim 47, further comprising:  
2 determining which port said outgoing loss report message is to be transmitted by a  
3 central processor (CPU) forwarding engine.
- 1 53. (Previously presented) The method as in claim 47, further comprising:  
2 generating said outgoing loss report message by a central processor (CPU) control  
3 engine.
- 1 54. (Previously presented) The method of claim 47, further comprising:  
2 carrying said outgoing loss report message in a NAK packet.
- 1 55. (Previously presented) The method of claim 47, further comprising:  
2 transmitting said outgoing loss report message by said router in response to the  
3 router receiving a loss report message from a downstream router.
- 1 56. (Previously presented) The method of claim 47, further comprising:  
2 transmitting said outgoing loss report message periodically by said router.

1 57. (Previously presented) The method as in claim 47, further comprising:  
2 transmitting said outgoing loss report message upstream so that it can be received  
3 at a source station of a multicast distribution tree, said source station controlling a trans-  
4 mission rate of data packets transmitted in said multicast distribution tree based on the  
5 value of said loss rate statistic stored in said outgoing loss report message.

1 58. (Previously presented) The method as in claim 47, further comprising:  
2 receiving said outgoing loss report message at a source station of a multicast dis-  
3 tribution tree; and  
4 controlling, in response to receiving said outgoing loss report message, a trans-  
5 mission rate of data packets transmitted by said source station in said multicast distribu-  
6 tion tree based on the value of said loss rate statistic stored in said outgoing loss report  
7 message.

1 59. (Previously presented) The method as in claim 47, further comprising:  
2 calculating an absolute value of a fractional change of said loss rate statistic as  
3 compared with a previous loss rate statistic; and  
4 preventing, in response to said calculated absolute value being less than or equal  
5 to a predetermined limit value, transmission of said outgoing loss report message.

1 60. (Previously presented) The method of claim 47, further comprising:  
2 associating with said loss rate statistic a lifetime for aging said loss rate statistic;  
3 determining whether said loss rate statistic is valid based on the value of said life-  
4 time associated with said loss rate statistic; and  
5 writing, in response to determining that said loss rate statistic is valid, said loss  
6 rate statistic into said outgoing loss report message before transmitting said outgoing loss  
7 report message.

1    61.    (Currently amended) A router, comprising:  
2        |        means for receiving a data packet ~~travelling~~traveling in a downstream direction at  
3    a first port;  
4        |        means for transmitting a replica of said data packet from a second port in said  
5    downstream direction;  
6        |        means for computing a loss of packets on selected ports of said router;  
7        |        means for calculating, in response to said loss of packets, a loss rate statistic; and  
8        |        means for transmitting an outgoing loss report message through said first port in  
9    an upstream direction, said outgoing loss report message containing said loss rate statistic  
10   in a field of said outgoing loss report message.

1    62.    (Currently amended) The router as in claim 61, further comprising:  
2        |        means for receiving a loss report message on said second port, said loss report  
3    ~~travelling~~traveling in said upstream direction; and  
4        |        means for calculating said loss rate statistic in response to said loss of packets and  
5    in response to said loss report.

1    63.    (Previously presented) The router of claim 61, further comprising:  
2        |        means for calculating said loss rate statistic as a largest loss rate in a set of loss  
3    rates determined for said selected ports of said plurality of ports.

1    64.    (Previously presented) The router of claim 61, further comprising:  
2        |        means for calculating said loss rate statistic as a time averaged loss rate.

1 65. (Previously presented) The router of claim 61, further comprising:  
2 means for computing said loss of packets by a processor mounted on a linecard,  
3 said linecard supporting at least one of said plurality of ports, said linecard having said  
4 linecard processor and a memory mounted thereon.

1 66. (Previously presented) The router of claim 61, further comprising:  
2 means for determining which port said outgoing loss report message is to be  
3 transmitted by a central processor (CPU) forwarding engine.

1 67. (Previously presented) The router as in claim 61, further comprising:  
2 means for generating said outgoing loss report message by a central processor  
3 (CPU) control engine.

1 68. (Previously presented) The router of claim 61, further comprising:  
2 means for carrying said outgoing loss report message in a NAK packet.

1 69. (Previously presented) The router of claim 61, further comprising:  
2 means for transmitting said outgoing loss report message by said router in re-  
3 sponse to the router receiving a loss report message from a downstream router.

1 70. (Previously presented) The router of claim 61, further comprising:  
2 means for transmitting said outgoing loss report message periodically by said  
3 router.

- 1    71.    (Previously presented) The router as in claim 61, further comprising:  
2            means for transmitting said outgoing loss report message upstream so that it can  
3    be received at a source station of a multicast distribution tree, said source station control-  
4    ling a transmission rate of data packets transmitted in said multicast distribution tree  
5    based on the value of said loss rate statistic stored in said outgoing loss report message.
- 1    72.    (Previously presented) The router as in claim 61, further comprising:  
2            means for receiving said outgoing loss report message at a source station of a  
3    multicast distribution tree; and  
4            means for controlling, in response to receiving said outgoing loss report message,  
5    a transmission rate of data packets transmitted by said source station in said multicast dis-  
6    tribution tree based on the value of said loss rate statistic stored in said outgoing loss re-  
7    port message.
- 1    73.    (Previously presented) The router as in claim 61, further comprising:  
2            means for calculating an absolute value of a fractional change of said loss rate sta-  
3    tistic as compared with a previous loss rate statistic; and  
4            means for preventing, in response to said calculated absolute value being less than  
5    or equal to a predetermined limit value, transmission of said outgoing loss report mes-  
6    sage.
- 1    74.    (Previously presented) The router of claim 61, further comprising:  
2            means for associating with said loss rate statistic a lifetime for aging said loss rate  
3    statistic;  
4            means for determining whether said loss rate statistic is valid based on the value  
5    of said lifetime associated with said loss rate statistic; and



6 means for writing, in response to determining that said loss rate statistic is valid,  
7 said loss rate statistic into said outgoing loss report message before transmitting said out-  
8 going loss report message.

1 75. (Currently amended) A computer readable media, comprising:  
2 said computer readable media having instructions written thereon for execution on  
3 a processor for the practice of a method of operating a router, the method having the steps  
4 of,  
5 receiving a multicast group data packet at a first port;  
6 transmitting a replica of said multicast group data packet from a second port;  
7 receiving an incoming loss report message on said second port;  
8 computing a loss of packets on selected ports of said router;  
9 calculating, in response to said incoming loss report message and said loss of  
10 | packets, a loss rate statistic; and  
11 transmitting an outgoing loss report message through said first port, said outgoing  
12 loss report message containing said loss rate statistic in a field of said outgoing loss re-  
13 port message.

1 76. (Currently amended) Electromagnetic signals propagating on a computer net-  
2 work, comprising:  
3 said electromagnetic signals carrying instructions for execution on a processor for  
4 the practice of a method of operating a router, the method having the steps of,  
5 receiving a multicast group data packet at a first port;  
6 transmitting a replica of said multicast group data packet from a second port;  
7 receiving an incoming loss report message on said second port;  
8 computing a loss of packets on selected ports of said router;  
9 calculating, in response to said incoming loss report message and said loss of  
10 | packets, a loss rate statistic; and

11           transmitting an outgoing loss report message through said first port, said outgoing  
12 loss report message containing said loss rate statistic in a field of said outgoing loss re-  
13 port message.

1    77.   (Currently amended) A computer readable media, comprising:  
2           said computer readable media having instructions written thereon for execution on  
3 a processor for the practice of a method of operating a router, the method having the steps  
4 of,  
5       |       receiving a data packet ~~travelling~~traveling in a downstream direction at a first  
6 port;  
7           transmitting a replica of said data packet from a second port in said downstream  
8 direction;  
9           computing a loss of packets on selected ports of said router;  
10          calculating, in response to said loss of packets, a loss rate statistic; and  
11          transmitting an outgoing loss report message through said first port in an upstream  
12 direction, said outgoing loss report message containing said loss rate statistic in a field of  
13 said outgoing loss report message.

1    78.   (Currently amended) Electromagnetic signals propagating on a computer net-  
2 work, comprising:  
3           said electromagnetic signals carrying instructions for execution on a processor for  
4 the practice of a method of operating a router, the method having the steps of,  
5       |       receiving a data packet ~~travelling~~traveling in a downstream direction at a first  
6 port;  
7           transmitting a replica of said data packet from a second port in said downstream  
8 direction;  
9           computing a loss of packets on selected ports of said router;  
10          calculating, in response to said loss of packets, a loss rate statistic; and

11           transmitting an outgoing loss report message through said first port in an upstream  
12   direction, said outgoing loss report message containing said loss rate statistic in a field of  
13   said outgoing loss report message.